- NANISIVIK MINE -

2003 ANNUAL WATER REPORT

NANISIVIK MINE
A division of CanZinco Ltd.

Nunavut Water Board
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Public Registry

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Table of Contents

List of Tables

List of Drawings

List of Appendixes

Executive Summary

Reclamation activities remained on hold pending submission and approval of various plans, studies and reports pertaining to final reclamation of the site as per the water licence issued in October 2002.

There was no major maintenance work necessary on the potable water system. Four additional valves were added to the decant structure to aid in controlling the water level in the polishing pond. Repairs were made to the downstream side of the East Adit Catchment dyke following a major rain event.

A Reclamation and Closure Cost estimate was prepared and submitted to the Board in July 2002. A revision of the estimate is currently underway.

The total volume of potable water pumped from East Twin Lake (ETL) for industrial purposes was 0 m^3.

The average East Twin Lake level was 371.76 metres with maximum and minimum levels of 373.19 metres and 371.19 metres respectively. The level of East Twin Lake was not at anytime, lower than the level of the West Twin Reservoir.

There was no tailings deposition or reclaim water pumped from West Twin Reservoir during the year.

During the year approximately 375,805 m^3 of water was decanted from the West Twin Reservoir. All sampling, sample preservation and quality control procedures were conducted in accordance with methods prescribed in the current edition of "Standard Methods for the Examination of Water and Wastewater".

Several field studies were required to provide additional information for reports necessary to complete the final closure plan. This included installation of additional geotechnical monitoring equipment, delineating and sampling shale borrow areas, Phase III environmental work as well as terrestrial, marine and ecological studies.

With a small crew, reclamation work was limited to minor clean up around the site, salvage and shipment of some of the assets to other breakwater properties, clean up of some contaminated soil from ocean view and covering exposed tailings with shale to prevent the spread of windblown contaminants.

1.0 Introduction

The Nunavut Water Board issued Nanisivik Mine, a division of CanZinco Ltd., the current license, NWB1NAN0208, on Oct 1, 2002. In compliance with Part B, Item 6 of the License, the following information is submitted as the 2003 Annual Water Report.

2.0 Required Reporting (As per part B - General conditions)

Item 6i.

A summary of any construction work, modification and major maintenance work and/or demolition work carried out on the Water Supply Facilities, West Twin Disposal Area, East Adit Treatment Facility, and associated structures;

Regular preventative maintenance was performed on the potable water system, including changing delivery pumps, fittings, and piping as required. However, no major maintenance work was necessary on this system. Four additional valves were added to the decant structure to aid in controlling the water level in the polishing pond. Repairs were made to the downstream side of the East Adit Catchment dyke following a major rain event. There was no other major construction activity, modifications or demolition work during 2003.

Item 6 ii.

A list of unauthorized discharges and summary of follow-up actions taken;

There was one spill reported in 2003.

1) East Adit Treatment facility – Over cresting resulting from pump failure during a major rain storm – Reported August 4, 2003

   Follow up Action: Back up pump activated and the downstream side of the catchment dyke was repaired.

Item 6 iii.

A Progress Report and/or revision of any studies or plans requested by the board under this licence

The following list of studies and reports as required under the License, were submitted in 2003

LICENSE REFERENCE	REPORT/STUDY
E/1	Revised Emergency Response Plan
G/13	Phase II Environmental Site Assessment
G/14	Human Health and Ecological Risk Assessment
G/16	Underground Mine Solid Waste Disposal Plan

The following list of studies and reports as required under the License, were in progress at year end 2003.

Table 1

LICENSE REFERENCE	REPORT/STUDY
G/3	Final Closure and Reclamation Plan
G/4	Engineering Design for Reclamation Covers
G/5	Assessment of Surface Cell and Test Cell Talik
G/6	Borrow Areas Development and Reclamation Plan
G/7	Engineering Design for West Twin Dyke Spillway
G/8	Waste Rock Reclamation Plan
G/9	Reclamation and Closure Monitoring Plan
G/15	West Twin Disposal Area Closure Plan
G/16	Revised Underground Mine Solid Waste Disposal Plan
G/17	Landfill Closure Plan

Item 6 iv.

An executive summary in terms understandable to the general public, translated into Inuktitut, of all plans, reports, or studies conducted under this licence.

Executive summaries for the environmental site assessment, Human Health & Ecological Risk Assessment and the underground solid waste disposal plan are included in Appendix E.

Item 6v.

A summary of any closure and reclamation work undertaken during the year and an outline of any work anticipated for the next year, including any changes to implementation and scheduling;

The focus during 2003 was maintaining the site with a small crew while revisions to the final closure plan were underway. Several field studies were required to provide additional information for reports necessary to complete the final closure plan. This included installation of additional geotechnical monitoring equipment; delineating and sampling shale borrow areas, Phase III environmental work as well as terrestrial, marine and ecological studies.

Several truckloads (approximately 230 m^3) of waste rock were removed from the Oceanview mining area during the summer. This material was identified during the phase 3 environmental site assessment and was taken to the East open pit.

Exposed tailings were covered with shale during the fall to prevent the spread of windblown contaminants. Reclamation will begin in the summer of 2004 pending approval of the various plans reports and studies submitted under the water license issued in October 2002.

Wolfden resources is planning to commence cleaning and dismantling some of the mill equipment and structures that they purchased for use at another property in Nunavut. It is anticipated that approval will be granted in late spring or early summer. If this is the case, then a campaign of shale haulage will commence to cover the surface cell in the West Twin Disposal Area. Other structures will be dismantled and the plan will be to commence with disposing of solid waste in the underground workings and removing contaminated soils and rock for deposit into the open pits or underground.

Waste Rock Summary

Ocean View was the only area that saw recovery during 2003.

Total recovery for 2003:	230 m^3
Estimated remaining (all areas):	59,341m^3

East Adit Area: 39N (north and south of road)

Inventory as of beginning of 2003:	36,180 m^3
Recovery for 2002:	0 m^3
Remaining inventory:	36,180 m^3

09 South:

Inventory as of beginning of 2003:	7,571 m^3
Recovery for 2002:	0 m^3
Remaining inventory:	7,571 m^3

02 South:

Inventory as of beginning of 2002:	15,590 m^3
Recovery for 2002:	0 m^3
Remaining inventory:	15,590 m^3

Ocean View:

Inventory as of beginning of 2002:	No starting value
Recovery for 2003:	230 m^3
Remaining inventory:	requires survey

In addition to the waste rock piles, 90,000 cubic metres of metal or Hydro Carbon contaminated soils have been identified on surface. Some of this material will be removed during 2004 but the schedule for dismantling the infrastructure will dictate when certain areas with contaminated soils are available for excavation.

Item 6 vi.

A Summary of the estimate of the total current mine closure cost based upon mine reclamation and monitoring activities carried out during the past year in accordance with Part B, Item 3 or Part G, Item 21

A Reclamation and Closure Cost estimate was prepared and submitted to the Board in July 2002. That budget represented the "best estimate case" and included progressive reclamation activities scheduled until year end 2002. There were no revisions/updates to

the July 2002 budget as of December 31, 2003, however, a new budget has been recently prepared and is presented in Appendix F.

Item 6 vii.

A public consultation/participation report describing consultation with local organizations and the residents of the nearby communities

On Saturday March 29th, 2003 a full-day technical meeting was held in Iqaluit to discuss the content of three reports submitted for approval to the Nunavut Water Board. The reports reviewed were the "2002 Phase II Environmental Site Assessment", the "Human Health and Ecological Risk Assessment" and the "Emergency Response Plan". Levi Barnabus represented the Hamlet of Arctic Bay at this meeting.

A public meeting was held in Arctic Bay on Thursday, April 17th, 2003 to present information and to encourage discussion concerning the Phase II ESA which describes the type and extent of contamination at the mine site; and the HHERA, which evaluates whether metal concentrations in the soils at the mine site pose a threat to the future health of humans or animals.

Patrick Duxbury of the Nunavut water board summarized the reports for the local residents while Robert Carreau and Murray Markle were in attendance to answer questions relating to the reclamation of the mine site.

Two meetings took place in Iqaluit with the Strathcona Sound Monitoring Committee to update the progress of reclamation activities, discuss community issues, training, Inuit roles with respect to monitoring and alternate uses for the site infrastructure. Representatives from the various governing agencies and Breakwater Resources were in Attendance as well as several residents of Arctic Bay that included Levi Barnabus, Moses Oyukuluk, Tommy Tatatuapik, Muctar Akumalik and Joannasie Akumalik. The meetings were held on June 6th and September 5th respectively.

Bill Heath was in Nanisivik in late October to meet with the elders of Arctic Bay and to discuss community issues and update them on the status of negotiations regarding the reclamation of the mine site.

Item 6 viii.

A Brief Summary of work done to address concerns or deficiencies listed in the inspection and/or compliance reports

An inspection was performed in May 2003 by DFO inspection officer Constantine Bodykovich. He noted several deficiencies during his inspection and the corrective action taken is listed below:

- Calcium Chloride tote bags were relocated to ensure that they were not within 100 feet of high tide.
- Fuel drums were removed from below the fuel pump house and replaced with a large tank to catch any future leakage. The stained soil beneath the pump house was removed to the land farm.
- A waste oil consolidation tray was removed from the dock lay down area as it was no longer required. Some oil soaked pallets were also removed and properly disposed of and some bungs were replaced on some empty oil drums.

On, Saturday July 5, 2003, Sid Bruinsma, Ken Russell, James Leo Noble and Colette Meloche from Environment Canada visited the site and were concerned that there may have been a spill resulting from secondary container movement during the relocation of the PCB Storage Building in the fall of 2002. This was not the case though as the containers were in fact welded to the floor of the building. The authorized entry log located inside the PCB storage building was not up to date as the three previous inspections only included external checks of the PCB Storage Building, spill kit, and fire extinguisher. The authorized entry log has since been updated and the inspection records for all subsequent inspections are inside the storage building. Monthly inspections continue and include an internal inspection of the storage building.

Mr. Gerry Ferris of BGC Engineering conducted the annual geotechnical inspection. Some minor maintenance work was carried out following his inspection which included repairing some imperfections on the WTDA dyke, shoring up the dyke between the polishing pond and the twin lakes creek, covering exposed liner at the tank farm catchment berm and repairing the bank at the lower dump pond.

Item 6 ix.

A Report on the Effluent and Water quality monitoring studies conducted during a calendar year.

a. The total volume of potable water pumped from East Twin Lake (ETL) was 187,172 cubic metres (See Table Below). This water was not for industrial purposes.

Table 2

Water Pumped from East Twin Lake			
Month	**Industrial**	**Town**	**Total**
January	0	16817	16817
February	0	14039	14039
March	0	15280	15280
April	0	14763	14763
May	0	15649	15649
June	0	14910	14910
July	0	17449	17449
August	0	16817	16817
September	0	14905	14905
October	0	15929	15929
November	0	15355	15355
December	0	15259	15259
Total	**0**	**187172**	**187172**

The average lake level of ETL was 371.76 metres for the year with maximum and minimum levels of 373.19 metres and 371.19 metres respectively The level of ETL was not at anytime, lower than the level of West Twin Lake. The minimum difference in elevation between the two lakes was 0.21 m recorded on June 3. Elevations for East Twin Lake and West Twin reservoir are tabled in Appendix A-1 and Appendix A-2 respectively. A graphical comparison follows in Appendix A-3.

b. During the year approximately 375,805 cubic metres of water was decanted from the West Twin Reservoir. No water was discharged at the East Adit Treatment Facility from the Final Discharge point. All sampling, sample preservation and quality control procedures were conducted in accordance with methods prescribed in the current edition

of "Standard Methods for the Examination of Water and Wastewater". Samples were collected at the West Twin decant, monitoring stations downstream in the Twin Lakes Creek and at monitoring stations along Chris Creek. The Sampling locations required by the water license are indicated on drawings 1 to 4 by solid red circles beside the name of the station. Tabulated summaries of the data generated for each monitoring station are included as Appendix B. Acute lethality tests and Daphnia Magna Monitoring tests were conducted on the effluent at station 159-4 as per the MMER. The first test was conducted on August 9th, one month after effluent deposition began. The results of these tests were 0% mortality for rainbow trout and 83.3% mortality for daphnia magna at 100% effluent concentration. The second set of tests were conducted on September 13th and the results obtained were 0% mortality for rainbow trout and 100% mortality for daphnia magna at 100% effluent concentration. Appendix D contains the test reports in their entirety.

c. Appendix C contains the effluent characterization and water quality monitoring data required by the metal mine effluent regulations (MMER) and Appendix D contains the sublethal toxicity reports required by the EEM. The coordinates and elevations for the sampling stations are as follows:

Station	Latitude	Longitude	Elevation (m)
159-4	73° 01' 29.4" N	84° 28' 32.8" W	368.196
159-4A	73° 01' 32.3" N	84° 28' 33.5" W	366.914
159-4B	73° 01' 33.2" N	84° 28' 20.9" W	366.742

Water flows from the West Twin Reservoir to a polishing pond prior to being discharged to twin lakes creek. The water is held back by a Steel plate barrier that contains seven 6 inch valves. Sampling station159-4 is located at this decant structure. 159-4A is located approximately 50 metres downstream from the decant structure and 159-4B is located approximately 50 metres upstream from the decant structure.

A brief interpretation of Test results for the the toxicity and sub lethal toxicity is tabled below

Toxicity and Sublethal Toxicity Results, 2003

Date	**Result**	Commentary
2003-08-09	*Daphnia* Test – lethal, 83.3% mortality. Rainbow Trout Test – not lethal	Heavy metals data from Nanisivik daily monitoring reports, Station 159-4. Cd 0.0007 mg/L, Cu 0.052 mg/L, Pb 0.015 mg/L, Zn 0.197 mg/L, NH3 2.18 mg/L, pH 7.3 at an estimated hardness of 120 mg/L as $CaCO_3$. Lab reports hardness >1000 mg/L as $CaCO_3$.
2003-08-09	*Selenastrum* Test IC25 growth 10.4% *Ceriodaphnia* Test LC50 survival 57.6% *Ceriodaphnia* Test IC25 reproduction 9.3% Fathead minnow Test LC50 survival >100% Fathead minnow Test IC25 growth >100% *Lemna minor* Test IC25 weight >97% *Lemna minor* Test IC25 frond >97%	
2003-09-13	*Daphnia* Test – lethal, 100% mortality. Rainbow Trout Test – not lethal	Heavy metals data from Nanisivik daily monitoring reports, Station 159-4. Cd 0.0004 mg/L, Cu 0.061 mg/L, Pb 0.012 mg/L, Zn 0.210 mg/L, NH3 2.81 mg/L, pH 7.24 at an estimated hardness of 120 mg/L as $CaCO_3$. Lab reports hardness >1000 mg/L as $CaCO_3$.
2003-09-13	*Selenastrum* Test IC25 growth 8.6% *Ceriodaphnia* Test LC50 survival 30.8% *Ceriodaphnia* Test IC25 reproduction 8.7% Fathead minnow Test LC50 survival >100% Fathead minnow Test IC25 growth >100% *Lemna minor* Test IC25 weight >97% *Lemna minor* Test IC25 frond 37%	

Acute Toxicity thresholds for Rainbow Trout and *Daphnia magna* are as follows:

Cadmium – not likely to be lethal to *Daphnia* or trout at the measured concentrations.
Copper, 0.01 to 0.1 mg/L (both species). Estimated LC50 to Rainbow Trout at 120 mg/L hardness is 0.128 mg/L.
Lead, 0.03 to 10 mg/L (*Daphnia*) and 1 to 10 mg/L (Rainbow Trout). Estimated LC50 (trout) is 3.8 mg/L.
Zinc, 0.3 to 2 mg/L (*Daphnia*) and 0.1 to 1 mg/L (Rainbow Trout). Estimated LC50 (trout) is 2.3 mg/L.
Ammonia, 0.1 to 10 mg/L (total ammonia), depending upon pH. Estimated LC50 (both species) is 3 mg/L at pH 7.3

Therefore, acute lethality to *Daphnia magna* is most likely attributable to ammonia, with possible stress from copper.

Sublethal Toxicity results for *Selenastrum*, *Ceriodaphnia*, Fathead Minnow and *Lemna minor*:

Sublethal toxicity results are consistent with the acute toxicity and chemical monitoring results.

- There was no acute or sublethal toxicity to fish (Rainbow Trout or Fathead Minnow tests).
- Acute toxicity to *Daphnia magna* was more pronounced in September than in August, and this result was mirrored in the *Ceriodaphnia* tests (LC50 and IC25 occurred at lower effluent concentrations in September than in August).
- There was little sensitivity of the *Lemna minor* test (only the IC25 for frond development showed inhibition, in September).
- The Selenastrum test showed inhibition at an effluent concentration of 10.4% in August, and 8.6% in September

Figure 1

Twin Lakes Area Water Sampling Stations

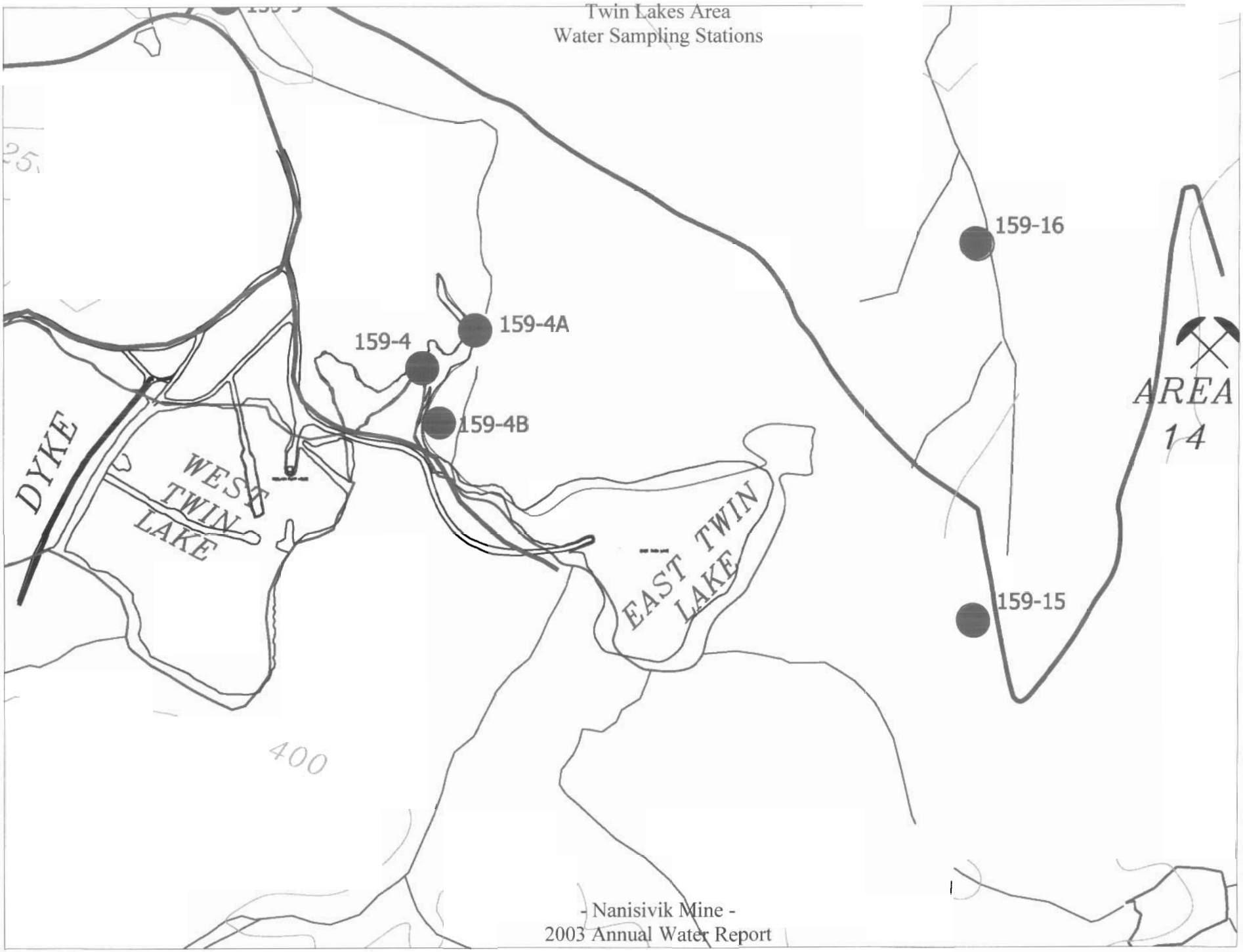
Twin Lakes Area
Water Sampling Stations
159-16
159-4A
159-4
159-4B
159-15
DYKE
WEST TWIN LAKE
EAST TWIN LAKE
AREA 14
400

Figure 2

Industrial Area Water Sampling Stations

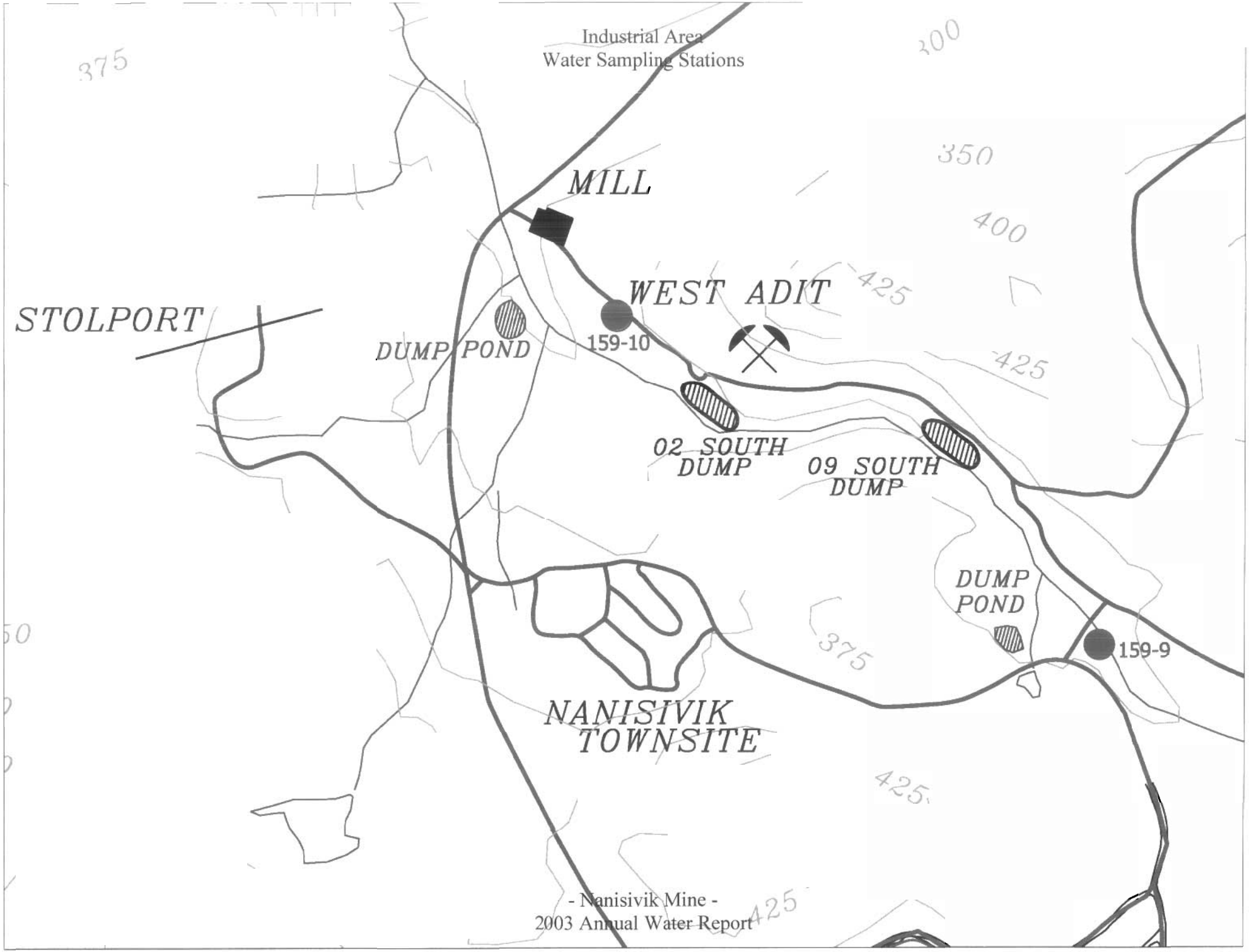
Industrial Area
Water Sampling Stations
MILL
WEST ADIT
STOLPORT
DUMP POND
159-10
02 SOUTH DUMP
09 SOUTH DUMP
DUMP POND
159-9
NANISIVIK TOWNSITE
375
350
400
425

Figure 3

East Adit Area Water Sampling Stations

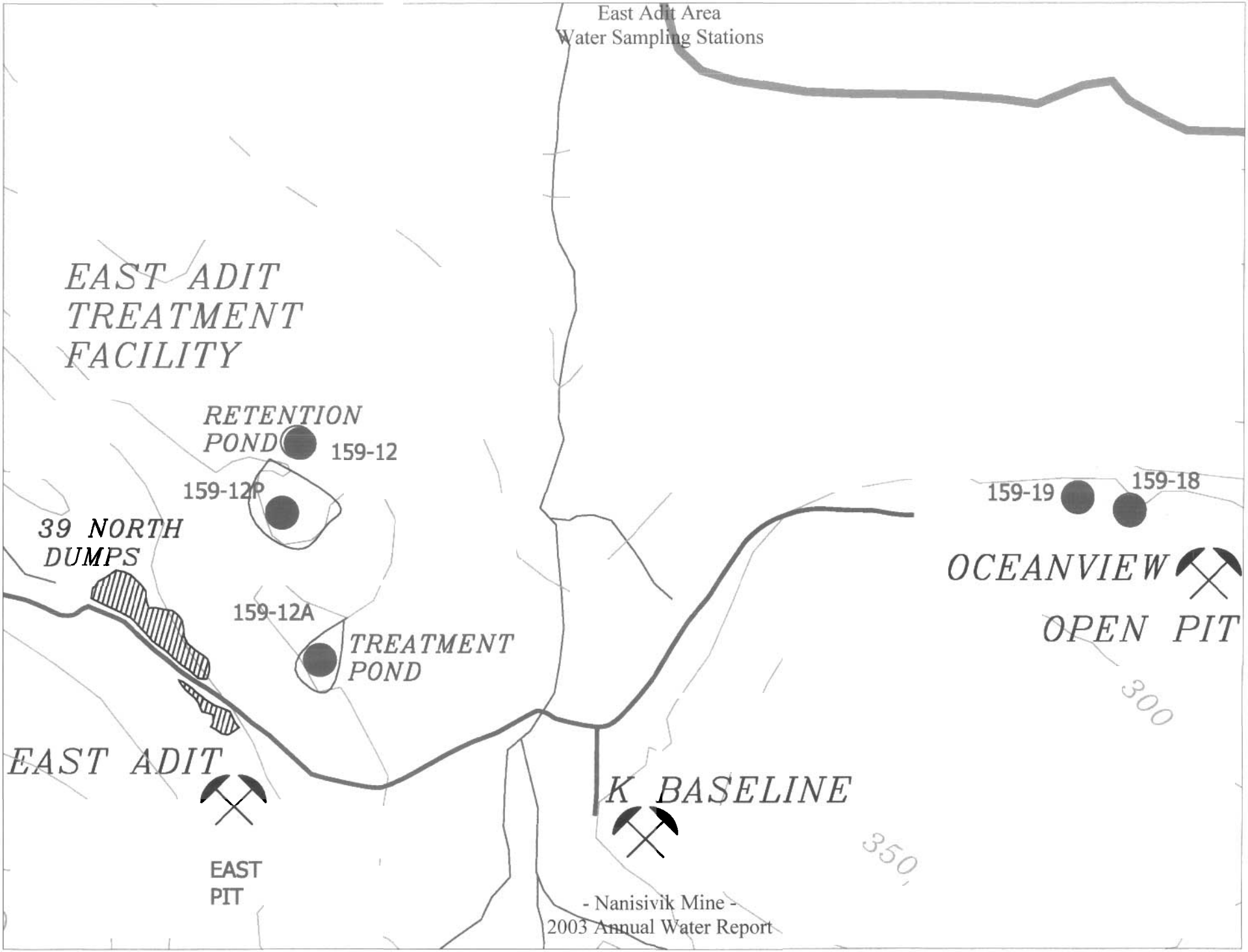
East Adit Area
Water Sampling Stations
EAST ADIT
TREATMENT
FACILITY
RETENTION
POND
159-12
159-12P
39 NORTH
DUMPS
159-12A
TREATMENT
POND
159-19
159-18
OCEANVIEW
OPEN PIT
300
EAST ADIT
EAST
PIT
K BASELINE
350

Figure 4

Dock Area Water Sampling Stations

Dock Area
Water Sampling Stations